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EXAMINER	
MARTIN, LAURA E	
ART UNIT	**PAPER NUMBER**
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/824,335	SHINKAWA ET AL.	
	Examiner	Art Unit	
	Laura E. Martin	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-61* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-61* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/14/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7, 12, 47-53, and 59-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550) in view of Nishida et al. (US 20030146742).

As per claims 1, 2, 50 and 51, Nishihara teaches a droplet ejection apparatus comprising: a plurality of ejection heads [0004], each of the droplet ejection heads including a diaphragm (figure 1B, element 176); an actuator which displaces the diaphragm (figure 1B, element 106); a cavity filled with a liquid (figure 2, element 162), an internal pressure of the cavity being increased and decrease in response to the displacement of the diaphragm [0042]; a nozzle communicated with the cavity (figure 9, element 188), through which the liquid is ejected in the form of droplets in response to the increase and decrease of the internal pressure of the cavity [0152-0157]; a driving circuit which drives the actuator of each droplet ejection head [0130]; a residual vibration detecting means for detecting a residual vibration of the diaphragm displaced by the actuator after the actuator has been driven [0130]; computation means (figure 10, element 212) for carrying out computation for the number of reference pulses generated

by the pulse generating means on the basis of residual vibration of the diaphragm detected by the residual vibration detecting means [0155]; time measuring means for measuring a lapsed time since the actuator has been driven by the driving circuit [0130]; and head failure judging means for judging a head failure in the droplet ejection heads on the basis of the computation result means and the lapsed time measured by the time measuring means (figure 10, element 213).

As per claims 3 and 53, Nishihara teaches the droplet ejection apparatus wherein the computation means [0012] includes timing generating means for generating predetermined timing on the basis of the residual bibration detected by the residual vibration detection means, a counter which counts [0012] the number of reference pulses (figure 10, element 300) generated by the pulse generating means for a predetermined time period, and holding means which holds the count value of the counter at the timing generated by the timing generating means (figure 10, element 208; [0158]).

As per claim 5, Nishihara teaches a memory for storing a predetermined value (figure 10, element 208; [0158])

As per claim 12, Nishihara teaches a head failure judging means judeges a cause of the head failure on the basis of the count value held by the holding means and the lapsed time [0156].

As per claims 48 and 59, Nishihara teaches an actuator including an electrostatic actuator [0190].

As per claim 49 and 60, Nishihara teaches the actuator including a piezoelectric

actuator (figure 1A, element 106) having a piezoelectric element and using a piezoelectric effect of the piezoelectric element [0039-0040]

As per claim 52, Nishihara teaches carrying out recovery processing to eliminate a cause of the head failure in response to the judged cause of the head failure [0168].

As per claims 1, 2, 50, and 51, Nishihara does not teach a pulse generating means for generating reference pulses.

As per claim 4, Nishihara does not teach the counter subtracting the number of reference pulses generated for the predetermined time period from a predetermined reference value.

As per claim 6, Nishihara does not teach a temperature sensor for measuring ambient temperature of the plurality of droplet ejection heads.

As per claim 7, Nishihara does not teach a predetermined reference value is corrected on the basis of the ambient temperature measured by the temperature sensor.

As per claim 47, Nishihara does not teach an electrostatic actuator.

As per claims 1, 2, 50, and 51, Nishida et al. teaches a pulse generating means for generating reference pulses (figure 3, element 31).

As per claim 4, Nishida et al. teaches counter subtracting the number of reference pulses generated for the predetermined time period from a predetermined reference value [0204].

As per claim 6, Nishida et al. teaches a temperature sensor (figure 3, element 37) for measuring ambient temperature of the plurality of droplet ejection heads [0316].

As per claim 7, Nishida et al. teaches a predetermined reference value is corrected on the basis of the ambient temperature measured by the temperature sensor [0315].

As per claim 47, Nishida et al. teaches an electrostatic actuator [0353].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara with the disclosure of Nishida et al. in order to create a higher quality sensing system.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550) and Nishida et al. (US 20030146742), and further in view of Usui et al. (US 20030043216).

Nishihara and Nishida et al. teach the droplet ejection apparatus of claim 3; however, neither discloses a predetermined time period is a time period until the residual vibration is generated after driving the actuator.

Usui et al. teaches a predetermined time period is a time period until the residual vibration is generated after driving the actuator [0289].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified in order to create a higher quality printer.

Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550) and Nishida et al. (US 20030146742), and further in view of Fujii et al. (US 20010007460).

Nishihara and Nishida et al. teach the droplet ejection apparatus of claim 3; however, neither teach the predetermined time period corresponding to a first half cycle of the residual value or a predetermined time period is a time period corresponding to a first one cycle of the residual vibration.

Fujii et al. teaches the predetermined time period corresponding to a first half cycle of the residual value or a predetermined time period is a time period corresponding to a first one cycle of the residual vibration (figure 8; [0107]).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified in order to create a higher quality printer.

Claims 11 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550) and Nishida et al. (US 20030146742), and further in view of Ishinaga et al. (US 20020149637).

Nishihara and Nishida et al. teach the droplet ejection apparatus of claims 1 and 2; however, neither discloses the head failure judging means judging a presence or absence of the head failure in the droplet ejection heads and a cause thereof on a basis of the computation result by the computation means and the lapsed time.

Ishinaga et al teaches the head failure judging means judging a presence or absence of the head failure in the droplet ejection heads and a cause thereof on a basis of the computation result by the computation means and the lapsed time [0201-0203].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Ishinaga et al. in order to create a higher quality error detection system.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550) and Nishida et al. (US 20030146742), and further in view of Kawamura (US 4577203).

Nishihara and Nishida et al. teach a droplet ejection apparatus; however, none disclose the head failure judging means judges that an air bubble has been intruded into the cavity as the cause of the head failure in the case where the held count value is larger than a first count value.

Kawamura teaches a head failure judging means judges that an air bubble has been intruded into the cavity as the cause of the head failure in the case where the held count value is larger than a first count value (column 3, line 65-column 4, line 8).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Kawamura in order to create a higher quality error detection system.

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550) and Nishida et al. (US 20030146742), and further in view of Koitabashi et al. (US 20020021325).

Nishihara and Nishida et al. teach a droplet ejection apparatus; however, none disclose the head failure judging means judges the cause of the head failure according to the lapsed time in the case where the held count value is smaller than a first count threshold.

Koitabashi et al. teaches a head failure judging means judges the cause of the head failure according to the lapsed time in the case where the held count value is smaller than a first count threshold [0146].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Koitabashi et al. in order to create a higher quality error detection system.

Claims 15, 16, 18, and 22 are rejected under 35 U.S.C. 103(a) as being obvious over Nishihara (US 20020144550), Nishida et al. (US 20030146742), and Koitabashi et al. (US 20020021325), and further in view of Sakagami et al. (US 20050122360).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an

invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Nishiara, Nishida et al., and Koitabashi et al. teach a droplet ejecting apparatus; however, none of these sources teaches a head failure judging means judging that much paper dust is adhering in the vicinity of the outlet of the nozzle as the cause of the head failure in the case where the held count is smaller than a third count threshold [0176]; wherein the head failure judging means judges that little paper dust is adhering in the vicinity of the outlet of the nozzle as the cause of the head failure in the case where the held count is in the range between a second count threshold and a third count threshold [0176]; wherein the head failure judging means judges that much paper is adhering in the vicinity of the outlet of the nozzle as the cause of the head failure in the case where the held count value is smaller than a third count threshold and the lapsed time is in the range between first and second time thresholds [0176]; and wherein the head failure judging means judges that little paper dust is adhering in the vicinity of the outlet of the nozzle as a cause of the head failure in the case where the

held count value is in the range between a second count threshold and a third count threshold and the lapsed time is larger than a second count threshold [0176].

Sakagami et al. teaches a head failure judging means judging that much paper dust is adhering in the vicinity of the outlet of the nozzle as the cause of the head failure in the case where the held count is smaller than a third count threshold; wherein the head failure judging means judges that little paper dust is adhering in the vicinity of the outlet of the nozzle as the cause of the head failure in the case where the held count is in the range between a second count threshold and a third count threshold; wherein the head failure judging means judges that much paper is adhering in the vicinity of the outlet of the nozzle as the cause of the head failure in the case where the held count value is smaller than a third count threshold and the lapsed time is in the range between first and second time thresholds; and wherein the head failure judging means judges that little paper dust is adhering in the vicinity of the outlet of the nozzle as a cause of the head failure in the case where the held count value is in the range between a second count threshold and a third count threshold and the lapsed time is larger than a second count threshold.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Sakagami et al. in order to create a higher quality printing apparatus.

Claims 17, 20, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550), Nishida et al. (US 20030146742), and Koitabashi et al. (US 20020021325), and further in view of Baezner et al. (US 5581287).

Nishiara, Nishida et al., and Koitabashi et al. teach a droplet ejecting apparatus; however, none of these sources teaches the head failure judging means judging that the head failure does not occur in the case where the count value is in the range between the first count threshold and the second count threshold, and the lapsed time is in the range between the first and second time thresholds, and the lapsed time is larger than the second time threshold.

Baezner et al. teaches a head failure judging means judging that the head failure does not occur in the case where the count value is in the range between the first count threshold and the second count threshold, and the lapsed time is in the range between the first and second time thresholds, and the lapsed time is larger than the second time threshold (column 4, lines 9-25).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Baezner et al. in order to create a higher quality printing apparatus.

Claims 19 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550), Nishida et al. (US 20030146742), and Koitabashi et al. (US 20020021325), and further in view of Noyes et al. (US 6364452).

Nishiara, Nishida et al., and Koitabashi et al. teach a droplet ejecting apparatus; however, none of these sources teaches the head failure judging means judging that the liquid vicinity of the nozzle has somewhat thickened due to drying as the cause of the head failure and a third count threshold and the lapsed time in the range between the first and second time thresholds; and the head failure judging means judging that the liquid vicinity of the nozzle has considerably thickened due to drying as the cause of the head failure in the case where the held count value is smaller than a third count threshold and the lapsed time is larger than a second time threshold.

Noyes et al. teaches none of these sources teaches the head failure judging means judging that the liquid vicinity of the nozzle has somewhat thickened due to drying as the cause of the head failure and a third count threshold and the lapsed time in the range between the first and second time thresholds; and the head failure judging means judging that the liquid vicinity of the nozzle has considerably thickened due to drying as the cause of the head failure in the case where the held count value is smaller than a third count threshold and the lapsed time is larger than a second time threshold (column 80, lines 12-23).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Noyes et al. in order to create a higher quality printing apparatus.

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550), Nishida et al. (US 20030146742), and Ishinaga et al. (US 20020149637), and further in view of Usui (6820955).

Nishihara, Nishida et al., and Ishinaga et al. teach a droplet ejection apparatus; however, none teaches recovery means for carrying out recovery processing to eliminate the cause of the head failure judged by the head failure judging means.

Usui teaches recovery means for carrying out recovery processing (figure 5, elements 5 and 10) to eliminate the cause of the head failure judged by the head failure judging means (column 22, line 60-column 23, line 55).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Usui in order to create a higher quality printer.

Claims 25-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550), Nishida et al. (US 20030146742), Ishinaga et al. (US 20020149637), and Usui (6820955), and further in view of Yamaguchi et al. (US 5379061).

Nishihara, Nishida et al., Isinaga et al., and Usui teach an droplet ejection apparatus; Usui teaches: in claim 26, a recovery means carries out the flushing process or the pump-suction process in the case where it is judged that the cause of the head

failure is the little thickening of the liquid due to drying (column 8, lines 20-50; column 2, lines 2-27); in claim 27, a recovery means carries out the pump-suction process in the case where it is judged that the cause of the head failure is the considerable thickening of the liquid due to drying (column 11, line 59- column 12, line 7). None of these sources teach:

As per claim 25, the droplet ejection apparatus as claimed in claim 24, wherein the recovery means includes: wiping means for carrying out a wiping process in which a nozzle surface of the plurality of droplet ejection heads where the nozzles are arranged is wiped with a wiper; flushing means for carrying out a flushing process by which the droplets are preliminarily ejected through the predetermined nozzle by driving the actuator; and pumping means for carrying out a pump-suction process with the use of a pump connected to a cap that covers the nozzle surface of the plurality of droplet ejection heads.

As per claim 28, the recovery means changes the number of ejections in the flushing process or a suction time of the pump in the pump-suction process according to the degree of the thickening of the liquid due to drying and carries out the flushing process or the pump-suction process in the case where it is judged that the cause of the head failure is the thickening of the liquid due to drying.

As per claim 29, the recovery means carries out the wiping process in the case where it is judged that the cause of the head failure is the adhesion of paper dust.

As per claim 30, the recovery means changes the number of wiping operations in the wiping process according to the degree of the adhesion of paper dust and carries out the wiping process in the case where it is judged that the cause of the head failure is the adhesion of paper dust.

As per claim 31, the recovery means changes the number of wiping operations in the wiping process according to the degree of the ejection operations in the flushing process in response to the lapsed time and carries out the flushing process in the case where it is judged that the cause of the head failure is the little thickening of the liquid due to drying when the flushing process is to be carried out.

As per claim 32, the recovery means carries out the pump-suction process in the case where the cause of the head failure is the intrusion of air bubble.

As per claim 33, the recovery means changes a suction time of the pump in the pump-suction process according to the computation result and carries out the pump-suction process in the case where it is judged that the cause of the head failure is the intrusion of air bubble.

Yamaguchi et al teaches:

As per claim 25, the droplet ejection apparatus as claimed in claim 24, wherein the recovery means includes: wiping means for carrying out a wiping process (column 25, line 44-column 26, line 5) in which a nozzle surface of the plurality of droplet ejection heads where the nozzles are arranged is wiped with a wiper; flushing means for

carrying out a flushing process (column 5, line 19-column 6, line 7) by which the droplets are preliminarily ejected through the predetermined nozzle by driving the actuator; and pumping means for carrying out a pump-suction process with the use of a pump connected to a cap that covers the nozzle surface of the plurality of droplet ejection heads (column 5, line 19-column 6, line 7).

As per claim 28, the recovery means changes the number of ejections in the flushing process or a suction time of the pump in the pump-suction process according to the degree of the thickening of the liquid due to drying and carries out the flushing process or the pump-suction process in the case where it is judged that the cause of the head failure is the thickening of the liquid due to drying (column 8, lines 20-50; column 2, lines 2-7).

As per claim 29, the recovery means carries out the wiping process in the case where it is judged that the cause of the head failure is the adhesion of paper dust (column 25, line 44-column 26, line 5).

As per claim 30, the recovery means changes the number of wiping operations in the wiping process according to the degree of the adhesion of paper dust and carries out the wiping process in the case where it is judged that the cause of the head failure is the adhesion of paper dust (column 25, line 15-column 26, line 5).

As per claim 31, the recovery means changes the number of wiping operations in the wiping process according to the degree of the ejection operations in the flushing process in response to the lapsed time and carries out the flushing process in the case

where it is judged that the cause of the head failure is the little thickening of the liquid due to drying when the flushing process is to be carried out (column 25, line 15-column 26, line 5; column 8, lines 20-50; column 2, lines 2-7).

As per claim 32, the recovery means carries out the pump-suction process in the case where the cause of the head failure is the intrusion of air bubble (column 6, lines 26-33).

As per claim 33, the recovery means changes a suction time of the pump in the pump-suction process according to the computation result and carries out the pump-suction process in the case where it is judged that the cause of the head failure is the intrusion of air bubble (column 6, lines 8-34).

Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550), Nishida et al. (US 20030146742), Ishinaga et al. (US 20020149637), and Usui (6820955), and further in view of Fujii et al. (US 20010007460).

Nishihara, Nishida et al., Isinaga et al., and Usui teach the droplet ejection apparatus; however, none teaches a recovery means carrying out the recovery processing until the cause of the head failure judged by the heard failure judging means is eliminated.

Fujii et al. teaches a recovery means carrying out the recovery processing until the cause of the head failure judged by the heard failure judging means is eliminated [0015].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Fujii et al. in order to create a higher quality printing system.

Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550), Nishida et al. (US 20030146742), Ishinaga et al. (US 20020149637), and Usui (6820955), and further in view of Hayakawa et al. (US 20020130918).

Nishihara, Nishida et al., Isinaga et al., and Usui teach the droplet ejection apparatus; however, none teaches an informing means for informing that the head failure is not recovered in the case where the cause of the head failure is not eliminated even though the recovery means carried out by the recovery processing.

Hayakawa et al. teaches an informing means for informing that the head failure is not recovered in the case where the cause of the head failure is not eliminated [0055-0056] even though the recovery means carried out by the recovery processing [0058].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Hayakawa et al. in order to create a higher quality printing system.

Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550), Nishida et al. (US 20030146742), Ishinaga et al. (US 20020149637), Usui (6820955), and Hayakawa et al. (US 20020130918), and further in view of Takahashi et al. (US 20010002837).

Nishihara, Nishida et al., Isinaga et al., Usui, and Hayakawa et al. teach the droplet ejection apparatus; however, none teaches liquid storage means for storing liquid to be supplied to the cavity of the droplet ejection heads, wherein the informing means informs that the liquid storage means is to be exchanged in the case where the cause of the head failure is not eliminated even through the recovery means carried out by the recovery processing.

Takahashi et al. teaches liquid storage means for storing liquid to be supplied to the cavity of the droplet ejection heads, wherein the informing means informs that the liquid storage means is to be exchanged in the case where the cause of the head failure is not eliminated even through the recovery means carried out by the recovery processing [0135].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Takahashi et al. in order to create a higher quality printing system.

Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550), Nishida et al. (US 20030146742), Ishinaga et al. (US 20020149637), and Usui (6820955), and further in view of Ho et al. (US 20030007032),

Nishihara, Nishida et al., Isinaga et al., and Ho teach the droplet ejection apparatus; however, none teaches the droplet ejection apparatus constructed so as to stop printing operation when carrying out a printing operation in the case where the cause of the head failure is not eliminated even though the recovery means carried out by the recovery processing.

Ho teaches a droplet ejection apparatus constructed so as to stop printing operation when carrying out a printing operation in the case where the cause of the head failure is not eliminated even though the recovery means carried out by the recovery processing [0007].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Ho in order to create a higher quality printing system.

Claims 38 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550) and Nishida et al. (US 20030146742), and further in view of Kono (US 6322190).

Nishihara and Nishida et al. teach a droplet ejection apparatus; however, none teach a storage means for storing the judgment result judged by the head failure judging means in association with the nozzle for which the judgment was carried out.

Kono teaches a storage means for storing the judgment result judged by the head failure judging means in association with the nozzle for which the judgment was carried out.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Kono in order to create a higher quality printing apparatus.

Claims 39-41, 56, and 57 are rejected under 35 U.S.C. 103(a) as being obvious over Nishihara (US 20020144550) and Nishida et al. (US 20030146742), and further in view of Sakagami et al. (US 20040239714).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an

invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Nishihara teaches a plurality of residual vibration detection means [0130], a plurality of computation means [0155], a plurality of head failure judging means (figure 10, element 213)

Nishihara and Nishida et al. teach a droplet ejection apparatus; however, none teach switching means for switching a connection of the actuator from the driving circuit to the residual vibration detecting means after carrying out the droplet ejection operation by driving the actuator; switching means corresponding to the droplet ejection head in which the actuator has carried out the driving operation switches the connection of the actuator from the driving circuit to the corresponding residual vibration detecting means after carrying out the driving operation of the actuator of the droplet ejection head determined by the detection determining means, and then the head failure judging

means corresponding to the switched residual vibration detecting means judges the head failure of the corresponding droplet ejection head.

Sakagami et al. teaches switching means for switching a connection of the actuator from the driving circuit to the residual vibration detecting means after carrying out the droplet ejection operation by driving the actuator; switching means corresponding to the droplet ejection head in which the actuator has carried out the driving operation switches the connection of the actuator from the driving circuit to the corresponding residual vibration detecting means after carrying out the driving operation of the actuator of the droplet ejection head determined by the detection determining means, and then the head failure judging means corresponding to the switched residual vibration detecting means judges the head failure of the corresponding droplet ejection head [0173].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Sakagami et al. in order to create a higher quality printing apparatus.

Claims 42-46 and 58 are rejected under 35 U.S.C. 103(a) as being obvious over Nishihara (US 20020144550) and Nishida et al. (US 20030146742), and further in view of Sakagami et al. (US 20050122360).

The applied reference has a common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art

only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Nishihara and Nishida et al. teach a droplet ejection apparatus; however, neither teaches:

As per claim 42 and 58, the residual vibration detecting means includes an oscillation circuit and the oscillation circuit oscillates in response to an electric capacitance component of the actuator that varies with the residual vibration of the diaphragm or in response to an electromotive voltage component of the actuator.

As per claim 43, the ejection failure detecting means includes a resistor element connected to the actuator, and the oscillation circuit forms a CR oscillation circuit based

on the electric capacitance component of the actuator and a resistance component of the resistor element.

As per claim 44, the ejection failure detecting means includes an F/V converting circuit that generates a voltage waveform in response to the residual vibration of the diaphragm from a predetermined group of signals generated based on changes in an oscillation frequency of an output signal from the oscillation circuit.

As per claim 45, the ejection failure detecting means includes a waveform shaping circuit that shapes the voltage waveform in response to the residual vibration of the diaphragm generated by the F/V converting circuit into a predetermined waveform.

As per claim 46, the waveform shaping circuit includes: DC component eliminating means for eliminating a direct current component from the voltage waveform of the residual vibration of the diaphragm generated by the F/V converting circuit; and a comparator that compares the voltage waveform from which the direct current component thereof has been eliminated by the DC component eliminating means with a predetermined voltage value; wherein the comparator generates and outputs a rectangular wave based on this voltage comparison.

Sakagami et al. teaches:

As per claim 42 and 58, the residual vibration detecting means includes an oscillation circuit and the oscillation circuit oscillates in response to an electric

capacitance component [0024] of the actuator that varies with the residual vibration of the diaphragm or in response to an electromotive voltage component of the actuator.

As per claim 43, the ejection failure detecting means includes a resistor element connected to the actuator, and the oscillation circuit forms a CR oscillation circuit based on the electric capacitance component of the actuator and a resistance component of the resistor element [0024].

As per claim 44, the ejection failure detecting means includes an F/V converting circuit that generates a voltage waveform in response to the residual vibration of the diaphragm from a predetermined group of signals generated based on changes in an oscillation frequency of an output signal from the oscillation circuit [0026].

As per claim 45, the ejection failure detecting means includes a waveform shaping circuit that shapes the voltage waveform in response to the residual vibration of the diaphragm generated by the F/V converting circuit into a predetermined waveform [0026].

As per claim 46, the waveform shaping circuit includes: DC component eliminating means for eliminating a direct current component from the voltage waveform of the residual vibration of the diaphragm generated by the F/V converting circuit; and a comparator that compares the voltage waveform from which the direct current component thereof has been eliminated by the DC component eliminating means with a predetermined voltage value; wherein the comparator generates and outputs a rectangular wave based on this voltage comparison [0027].

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Sakagami et al. in order to create a higher quality printing apparatus.

Claim 61 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishihara (US 20020144550) and Nishida et al. (US 20030146742), and further in view of Usui (6820955).

Nishihara and Nishida et al. teach a droplet ejection apparatus; however, none teaches recovery means for carrying out recovery processing to eliminate the cause of the head failure judged by the head failure judging means.

Usui teaches recovery means for carrying out recovery processing (figure 5, elements 5 and 10) to eliminate the cause of the head failure judged by the head failure judging means (column 22, line 60-column 23, line 55).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the droplet ejection apparatus of Nishihara as modified with the disclosure of Usui in order to create a higher quality printer.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura E. Martin whose telephone number is (571) 272-2160. The examiner can normally be reached on Monday - Friday, 7:00 - 3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen D. Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Laura E. Martin

5/10/06

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PRIMARY EXAMINER